

VEHICLE FITTINGRELATED U.S. APPLICATIONS

Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED  
RESEARCH OR DEVELOPMENT

Not applicable.

REFERENCE TO MICROFICHE APPENDIX

Not applicable.

FIELD OF THE INVENTION

[0001] The present invention relates to a vehicle fitting and more particularly relates to a vehicle fitting suitable for use in a vehicle, such as, e. g. a minibus or a coach or an ambulance, which is to be utilized by a number of passengers of different types, some of whom may be handicapped.

BACKGROUND OF THE INVENTION

[0002] There are many vehicles which are used by a number of passengers, some of whom may be handicapped. Vehicles of this type are frequently operated by Local Councils, or Core Homes and the vehicles may transport patients who have various types of physical and/or mental handicap, some of whom may be in wheelchairs.

[0003] The provision of a seat fitting for a vehicle of this type presents the fitting designer with many challenges. An ideal seat fitting has a squab and a backrest in a conventional format so that the seat

can be utilized by a seat occupant who has no physical handicap, the seat fitting being configured to provide a degree of protection to the seat occupant if the vehicle is provided in a front impact or in a rear impact.

**[0004]** Also the ideal seat fitting should be adaptable for use with a wheelchair.

**[0005]** A seat fitting of this type may be designed so that the squab of the seat may be moved away from its first or "ordinary" position, with the backrest then being positioned so that the space in front of the backrest is unobstructed. Then a wheelchair may be brought up against the fitting, with a padded part of the fitting lying immediately behind the backrest of the wheelchair, and in such a way that a safety belt provided on the fitting may embrace the occupant of the wheelchair. In this way the safety belt may provide protection in the case of a front impact of the vehicle, and the part of the fitting located behind the backrest of the wheelchair will minimize the risk of the wheelchair occupant moving rearwardly out of the wheelchair in the event that a rear impact should occur.

**[0006]** Wheelchairs come in many different sizes, adult wheelchairs being relatively broad and some child wheelchairs being very narrow. The rearwardly projecting handles on the wheelchairs may thus have very different spacings between them.

**[0007]** The space available within a typical vehicle as used for the transport of handicapped people is generally limited and is often necessary to move a wheelchair, together with the wheelchair occupant, from the rear of the vehicle past a seat fitting of the type described above before the wheelchair can be manoeuver into position with the backrest of the wheel chair located just in front of part of the fitting.

**[0008]** The design of the ideal fitting would take all of these factors into account.

**[0009]** Whilst various fittings have been proposed previously, all commercially available fittings have one or more drawbacks.

### **BRIEF SUMMARY OF THE INVENTION**

**[0010]** The present invention seeks to provides a improved fitting.

**[0011]** According to one aspect of this invention there is provided a fitting for a motor vehicle, the fitting comprising a support configured to be secured to the floor of the vehicle, the support being provided with a seat squab, and being provided with a seat back mounting and backrest, the squab being moveable from an initial position in which the squab projects forward from the support to a position in which the squab does not obstruct the space in front of the backrest, the backrest being mounted to the seat back mounting by a mechanism which enables the backrest to be moved from an initial rearward position to a forward position. Preferably the squab is provided with two mounting fingers and two mounting lugs, the support being provided with formations to receive the fingers and hooks to engage the lugs to removably mount the seat squab.

**[0012]** Conveniently the mechanism connecting the backrest to the seat back mounting incorporates pivotal links.

**[0013]** Advantageously the backrest is connected to the seat back mounting by means of two upper pivotal links and two lower pivotal links, there being one upper and one lower pivotal link to one side of the seat back mounting and another upper and another lower pivot link to the other side of the seat back mounting.

**[0014]** Preferably each pivotal link comprises two straight arms which are pivotally interconnected.

**[0015]** Conveniently the mechanism is an over-dead-center mechanism.

**[0016]** Advantageously the over dead center mechanism comprises a drive bar passing through slots in two spaced apart plates provided on the backrest, the drive bar being mounted on at least one arm which is pivotally mounted to the mounting frame, so that the drive bar executes an arcuate movement.

**[0017]** Conveniently a handle is provided to move the said pivotally mounted arm.

**[0018]** In an alternative embodiment of the invention a motor is provided which is actuable to move the backrest forward.

**[0019]** Conveniently when in the forward position, the backrest can pivot about a horizontal axis.

**[0020]** According to another aspect of this invention, there is provided a fitting for a motor vehicle, the fitting comprising a support, the support being provided with a squab and a backrest to form a seat, the squab being moveable from an initial position in which the squab projects forward from the support to a position in which the squab does not obstruct the space in front of the backrest, the support being mounted for lateral movement.

**[0021]** Preferably the support incorporates a base plate, the base plate being mounted on a platform for lateral movement.

**[0022]** Advantageously the base plate is provided with at least one projection extending downwardly to engage with at least one channel formed in the platform.

**[0023]** Conveniently a band is provided associated with the platform to extend over the or each channel, the or each band extending from the base plate to a guide provided at one end of the respective channel, then passing through a passage extending under the platform, before passing a guide at the other end of the channel and extending back to the other side of the base plate.

**[0024]** In a preferred embodiment of the invention a clamp is provided to clamp the base plate in position.

**[0025]** In one embodiment a motor arrangement is provided to drive the base plate relative to the platform.

**[0026]** Preferably the backrest has a relatively wide upper portion and a relatively narrow lower portion.

**[0027]** According to another aspect of this invention there is provided a fitting for a motor vehicle, the fitting comprising a support supporting a backrest, the backrest being relatively broad at the top and being relatively narrow at a lower position.

**[0028]** Preferably the space in front of the backrest is unobstructed.

**[0029]** Advantageously a removable seat squab is provided which can be mounted in position adjacent the backrest to form a seat.

**[0030]** Preferably at least one seat belt is provided mounted on the fitting and passing through a guide at the top of the backrest.

**[0031]** Conveniently the backrest is mounted on a seat back mounting, and a mechanism is provided to move the backrest forward from an initial position to a second position.

**[0032]** Advantageously the seat back mounting is mounted to the support by a yieldable connection, adapted to yield when subjected to a force in excess of a predetermined force.

**[0033]** Preferably the upper part of the support is a torsion plate and the lower part of the seat back mounting frame is a torsion plate, the torsion plates being interconnected and forming the yieldable connection.

**[0034]** Advantageously the support may be provided with a winch, the winch being provided with at least an elongate flexible member such as a belt or strap provided with a termination configured to engage part of a wheelchair. The winch may be associated with a foot pedal to actuate the winch.

**[0035]** Preferably the fitting is provided with at least one safety-belt. The safety-belt may pass through a guide located adjacent one edge of the upper part of the seat back mounting.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

**[0036]** In order that the invention may be more readily understood, and so that further features thereof may be appreciated, the invention will now be described, by way of example with reference to the accompanying drawings in which:

**[0037]** FIGURE 1 is a front prospective view of a fitting in accordance with the invention,

**[0038]** FIGURE 2 is a rear view of the fitting of Figure 1,

**[0039]** FIGURE 3 is a sectional view through part of the fitting,

**[0040]** FIGURE 4 is another sectional view through part of the fitting,

**[0041]** FIGURE 5 is an exploded view of part of the fitting,

**[0042]** FIGURE 6 is a view of a further part of the fitting in a first condition, and

**[0043]** FIGURE 7 is a view, corresponding to Figure 7, showing the part of the fitting in a second condition.

#### DETAILED DESCRIPTION OF THE INVENTION

**[0044]** Referring to the drawings, Figures 1 and 2 illustrate a fitting 1 for use in a motor vehicle. The fitting 1 comprises a support 2 in the form of a support frame having two side arms 3,4. The lower

ends of the side arms are interconnected by a base plate 5. The upper ends of the side arms are interconnected by means of a horizontal torsion plate 6. Extending between the side arms 3,4, is a foot operated winch 7, having a rearwardly extending foot pedal. A strap 8, or the like, is wound on the winch 7. Each side arm 3,4 is provided with a seat-belt retaining buckle 9 and a squab retaining hook 10. The inner face of each side arm 3,4 is provided with a seat-squab-finger engaging formation 11.

**[0045]** The base plate 5 is provided with two depending projections 12, 13, (shown in Figure 3) each of dovetail form. The base plate 5 is also provided, on its under-surface, with a plurality of rollers 14, and is further provided with a manually actuable clamp 15.

**[0046]** The base plate 5 is mounted for movement across the upper surface of a platform 16, on the rollers 14, the platform 16 being mountable on the floor of a vehicle. The platform 16 is provided, in its upper surface, with two dovetail-shaped channels or grooves 17,18, each groove, accommodating a respective one of the dovetail projections 12, 13 provided on the base plate 5. The under-surface of the platform is provided with recesses 19,20 which extend beneath the dovetail-shaped grooves. At each end of the dovetail-shaped grooves and the underlying recesses a roller or guide 22,23 is provided.

**[0047]** A band 24, such as a band of a rubber material, is connected to the base plate 5 and positioned to overly each of the dovetail grooves 17,18 and to pass through the recesses 19,20. Each band 24 is connected to one side of the platform, extending across the top of the adjacent dovetail-shaped groove, around the roller or guide 22 at the end of the groove, to pass through the corresponding recess 19 provided in the under-surface of the platform 16, passing round the other guide or roller 23 at the other end of the groove and being connected to the other side of the base plate 5.

**[0048]** It is to be appreciated, therefore, that the base plate may move laterally, when the clamp 15 has been released, thus moving the entire fitting laterally. A motor may be provided to drive the fitting laterally if required. The bands 24 serve to prevent the ingress of dirt or waste material into the dovetail grooves 17,18.

**[0049]** The lateral movement of the base plate may be achieved, in alternative embodiments of the invention, by alternative mechanisms such as a worm gear mechanism, a cam mechanism or a telescopic tube mechanism. The telescopic tube may be driven hydraulically or pneumatically.

**[0050]** A seat squab 25 is provided to be releasably mounted on the support frame 2. When the seat squab 25 is mounted on the support 2 in an initial position the squab projects forward from the support, adjacent the base of a backrest, which will be described below, and the fitting can be used as a conventional seat. The seat squab 25 (as shown in Figure 5) has two rearwardly extending support arms 26,27, each support arm terminating with a rearwardly extending engagement finger 28,29. Extending outwardly away from each of the mounting fingers 28,29 is a respective laterally projecting mounting lug 30, 31, the mounting lugs being constituted by opposed ends of a transversely extending rod 32.

**[0051]** As mentioned above, the fingers 28,29 may engage with the corresponding seat-squab-finger engaging formations 11 provided on the inner faces of the side arms 3,4 of the support 2. The hook, 10, provided on each side arm 3,4 of the support may engage the respective lug 30,31 to retain the seat squab in position. Each hook 10 may be provided with a spring-biased plunger 33 adapted to engage with a corresponding aperture formed in the side arm 3 of the frame to retain the hook in the engaging position so that the squab 25 is retained firmly in place on the support 2. It is to be



appreciated, therefore, that the squab may be removed from the illustrated position, or returned to the illustrated position with great ease.

**[0052]** A seat back mounting 35 is provided in the form of a seat back mounting frame. The seat back mounting frame has, at its lower end, a horizontal torsion plate 36. The central region of the torsion plate 36 is connected to the central region of the torsion plate 6 provided at the upper part of the support frame 2.

**[0053]** The interconnected torsion plates, 6,36 form a yieldable connection which can yield, absorbing energy, when subjected to a force in excess of a predetermined force. Extending upwardly from the ends of the torsion plate 36 are two spaced-apart side arms 37,38 which have a predetermined spacing. Towards the upper end of the side arms 37,38, the arms diverge outwardly, being interconnected by a top rail 39, the top rail 39 thus having a greater length than the distance between the side arms 37, 38 (over a great part of their height).

**[0054]** A linkage 40, which will be described in greater detail below, is mounted on the seat back mounting frame 35, and supports a backrest 41. The linkage is a mechanism that enables the backrest 41 to be selectively moved from an initial rearward position, in which the backrest is immediately adjacent the seat back mounting frame 37, to a forward position in which the backrest 41 is moved forward and is thus spaced from the seat back mounting frame 37.

**[0055]** The backrest, 41, as can be seen most clearly in Figure 1, is relatively wide in an upper region 42 thereof, but is relatively narrow in a lower region 43. The width of the upper region 42 of the backrest is substantially equal to the width of the squab 25.

**[0056]** Seat-belt guide loops 44,45 are provided at the opposed ends of the top rail 39 to guide seat-belts 46,47. Each belt may be a three-point belt with a conventional retractor.

**[0057]** Turning now to Figures 6 and 7 the linkage 40 comprises two upper pivotal links 50,51 and two lower pivotal links 52,53 which each extend from the seat back mounting frame 35 to the backrest 41. There is one upper link 50 and one lower link 52 on one side 38 of the mounting frame 35, and one upper link 51 and one lower link 53 on the other side 37 of the mounting frame. Each link comprises two elongate straight arms, each arm having one end connected either to the seat back support frame 35 or to the backrest 41, the other ends of the arms being pivotally interconnected. Thus, for example, the link 50 comprises a first straight arm 54, having one end 55 pivotally connected to the seat back support frame 35, and another straight arm 56 having one end pivotally connected to the backrest by a pivotal connection 57. The two other ends of the arms are interconnected by a pivotal connection 58. The remaining links are each of an equivalent design.

**[0058]** The four links permit the backrest 41 to be moved forward and rearwardly relative to the seat back mounting frame 35.

**[0059]** A drive arrangement is provided to drive the backrest forward and rearwardly. Whilst, in some embodiments, the drive arrangement may include a motor or the like, in the illustrated embodiment the drive arrangement is manually actuated.

**[0060]** In the illustrated embodiment, as can be seen most clearly in Figures 6 and 7, the backrest 41 is provided, on its rear face, with two vertical rearwardly extending flanges 60, 61. Each flange is provided with a vertical slot 62,63.

**[0061]** A horizontal drive rod 64 is provided, opposed ends of the drive rod passing through the vertical slots 62,63. The drive rod 64 is supported by three parallel support fingers 65, 66, 67 which are mounted for pivotal movement on a pivotal support rod 68 which is mounted on the seat back mounting frame 35. The central support finger 66 is formed integrally with a handle 69. By grasping

the handle and rotating the handle and the support fingers about the axis of the support rod 68, the drive rod 64 may be driven up and down the vertical slots 62 and 63, effecting an arcuate movement. The effect of this is to move the backrest forward and rearwardly. As the drive rod moves downwardly, so the drive will pass through a "dead center" condition in which the drive rod has a maximum spacing from the mounting frame, and then the drive rod will move slightly back towards the mounting frame as it continues to move downwardly. The handle then occupies a final position, with part of the handle abutting a stop, or with the drive rod engaging the lowermost ends of the slots. With the seat back in this condition any force applied to the seat back tending to drive the seat back rearwardly towards the mounting frame will not enable the seat back to move rearwardly towards the mounting frame, since any rearward movement of the seat back would only be permissible if the drive rod could move further downwardly. The seat back is thus locked in the forward position.

**[0062]** Figure 6 shows the backrest 41 moved partly forward, from a rearmost position, and Figure 7 shows the backrest moved fully forward. It is to be appreciated that when the backrest is in the fully forward position, the upper part of the backrest may pivot rearwardly, about the axis defined by the drive rod 64 at the lower-most ends of the slots 62,63, with the upper linkages 50,51 becoming effectively compressed.

**[0063]** The fitting as described may be used, when in the condition of Figures 1 and 2, as a conventional seat. However, if the fitting is to be used with a wheelchair, initially the squab may be removed from the fitting simply by releasing the hooks 10 and withdrawing the squab 25 from the support. The squab 25 thus does not obstruct the space in front of the back rest 41. If a wheelchair is to be brought into the vehicle from the rear of the vehicle, it may be difficult to manoeuver the wheelchair past the fitting. The fitting may, in such a circumstance, be moved laterally simply by

releasing the clamp 15, and pushing the entire fitting to one side. The base plate 5 will roll over the underlying platform 16 by virtue of the rollers 14. The base plate 5 will be guided by the engagement between the depending dovetail projections 12,13 and the dovetail grooves 17,18. The bands 24 will be moved past the rollers or guides 22,23 as the platform moves, and will cover the otherwise open grooves 17,18. The fitting can be moved to a position where there is sufficient space to manoeuver the wheelchair past the fitting.

**[0064]** When the wheelchair has been manoeuver past the fitting, the fitting may be again moved laterally to an appropriate position and may then be clamped in position by means of the clamp 15. The wheelchair may then be moved so that the back of the wheelchair is adjacent the backrest 41 supported on the seat back mounting frame 35. The strap 8 may be attached to the wheelchair, using an appropriate hook or karabiner and the winch 7 may be operated to draw the wheelchair to the fitting. If the wheelchair is an electric wheelchair, or is some other form of wheelchair which has a rearwardly extending projection provided at the lower part of the back of the wheelchair, the backrest 41 may be moved forward relative to the seat back mounting frame 35 by actuating the handle 65. The backrest may thus be moved to a position in which it is located immediately adjacent the back of the wheelchair, with part of the wheelchair extending underneath the forward positioned backrest. The seat-belts 46,47 will be positioned to embrace the occupant of the wheelchair to hold the occupant against the backrest 41. Because the top rail 39 of the seat back mounting frame 35 is relatively wide, as wide as the squab 25, the seat belt guide loops 44,45 are spaced apart sufficiently to guide the seat belts 46,47 over the shoulders of an adult seat or wheelchair occupant.

**[0065]** It is to be appreciated that if the wheelchair is a relatively narrow wheelchair, having rearwardly extending handles which are not spaced very far apart, the handles may, nevertheless, be

accommodated to either side of the narrow part 43 of the backrest 41. The backrest 41 will, however, be able to contact the whole of the spine of a seat or wheelchair occupant in the event of a rear impact.

**[0066]** If the vehicle is involved in a front impact the seat belts will restrain the occupant of the wheelchair. In a rear impact the occupant of the wheelchair will be restrained by the seat back, and will thus be prevented from moving rearwardly out of the wheelchair. If a very substantial force is applied to the backrest the torsion plates 6,36 will distort, absorbing energy.

**[0067]** In the present Specification "comprises" means "includes or consists of" and "comprising" means "including or consisting of".

**[0068]** The features disclosed in the foregoing description, or the following Claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilized for realizing the invention in diverse forms thereof.